

## CLASSIFICATION OF INBRED LINES OF CORN \*

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Corn constitutes a very important part of American and, to a lesser extent, foreign agriculture. Hybrid corn is rapidly replacing the older grown varieties in most sections where corn is produced in any quantity. There are numerous kinds of hybrids. The inbred lines of corn that go to make up these combinations are also numerous. At this time, there is no published classification for these many and diverse inbred lines. Such a classification has a great deal of practical value.

At the present time, there is a good deal of secrecy between the different producers in regard to the pedigrees of certain hybrid combinations. A definite classification and complete description of a line would allow the line to be readily recognizable. This would help to do away with the need for secrecy.

The hybrid seed corn inspectors would have a definite means of checking on a combination. A producer would not be able to mislabel the double cross combination and sell it under a different hybrid number. Such a method for detection is not now available.

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\* The preliminary work on this project was reported by W. T. Federer: "A Classification for inbred lines of corn", M.S. Thesis, Kansas State College, 1941. A large part of this mimeographed material appears in the Annual Reports of Corn Investigations at Kansas State College, 1940 (pages 310 through 315) and 1941 (pages 399 through 418), under R. W. Jugenheimer.

Another purpose afforded by such a key, is the standardization of line nomenclature. At present, some lines have several different designations. Each station previously had a different system of naming lines; some used numbers, some used letters, and others used a combination of letters and numbers. There has recently been a trend toward standardization and simplification of line nomenclature. The experiment stations of some of the corn growing states have been given a certain letter to precede the number that is ascribed to that line. Each state has a different letter in order to avoid confusion. The letter is the first letter in the state's name, except in those cases where two or more states have names that begin with the same letter. In such cases, another letter or group of letters has been assigned to that state.

The enclosed material is being mimeographed and distributed to people in corn investigations. This is being done since several requests have been received for the keys on inbred lines of corn. Furthermore, this material has been brought together in part as thanks to the various research stations who co-operated so willingly in supplying the inbred lines.

In all there were 208 lines from 18 states. In addition, four more states (Colorado, South Dakota, New York, and Oklahoma) were contacted, but did not send inbred lines which could be included in the test. The following list gives the state and the number of inbred lines from each state.

Connecticut -	4	Missouri -	7
Florida -	4	Nebraska -	1
Illinois -	8	New Jersey -	5
Indiana -	8	Ohio -	11
Iowa -	19	Tennessee -	1
Kansas -	27	Texas -	3
Kentucky -	22	USDA, BPI-	14
Georgia -	25	Wisconsin -	9
Michigan -	2	Miscellaneous -	5
Minnesota -	33		

The miscellaneous five lines were not included in the key since insufficient data was obtained on them. The five lines were Indiana JC33, Iowa KR (osf), Iowa 198, Wisconsin CC25, and Wisconsin CC26. The two lines JC33 and KR (osf) were included in the classification of inbred lines given by the author in his Master's thesis. Therefore, the enclosed keys contain the classification of 203 lines instead of 208.

In using these keys it is suggested that each investigator use an abridged key involving only those lines in which he is interested. This will make the key much easier to follow and less cumbersome. In a few instances, two lines occupy the same position in the key. In some cases it was known that the lines were almost identical, but in others it was not certain that this was true. A further study will be needed to discriminate between the lines that appear in the same positions in a key.

The classification was based on one year's results of the inbred lines grown at three different locations, the three locations being at two replicates at the Agronomy Farm at Kansas State College, and the third at the Soil Conservation Service Nursery. The first two replicates were on dry land and the third was irrigated with overhead sprinklers. Although some minor discrepancies (due to different manifestations of some characters under different environments) with the enclosed keys may be found in the future, it is felt that in general no major changes in the classifications will be made.

Listing of the inbred lines with the originating station, the parent variety where available, synonyms for the various inbred lines where available, and some kernel and cob characteristics, is given below.

Originating station	Inbred line	Parent variety	Synonyms	Color of seed.	Kernel size.	Chaff color.
4.						
Connecticut	14	Conn. Leaming		Y	M	R
	20	Burr White (Ill. High Protein)		W	S	W
	21	Burr White (Ill. Low Protein)		dirty W	M	W
	243	Ill. Leaming		Y Y	M	R
Florida	1		11-129	W	M-L	R
	2		4-32	W	L	W
	3		B5-11	W	M	W
	4		B1-18	W	M	W
Illinois	A			golden Y	M	R
	90			light Y	S-M	R
	Hy			Y	M	R
	R4			dark Y	M	R
	5120			Y	M-L	R
	5678			Y	L	R
	ML4			Y	S-M	R
	L	Mann Leaming		Y	M	R
Indiana	66			light Y	S-M	R
	38-11			orange Y	M	R
	H5			reddish -orange Y	M	R
	WF9			light Y	L	R
	Tr			reddish -orange Y	M	R
	H22			W	M	W
	33-16			W	M	W
	Fc			Y	S	R
Iowa	153			reddish Y	M	R
	159			light Y	S-M	R
	197			golden Y	M	R
	205			dirty Y	S-M	R
	224			golden Y	M	R
	234			bright Y	M	R
	289			Y	S-M	R
	317			orange	S	R
	345			Y	M	R
	349			Y	M	R
	397			light Y	M-L	R
	401			light Y	M	R
	420			reddish	M	R
	426			Y	M	R
	447			reddish Y	M	R
	456			golden Y	M	R
	701			Y	S	R
	Pr			Y	M	R
	159L1			golden Y	S-M	R

Originating station	Inbred line	Parent variety.	Synonyms	Color of seed.	Kernel size.	Chaff color.
Kansas	8	Pride of Saline.		W	M	W
	10	" " "		W	S-M	W
	17	" " "		yellowish W	M	W
	19	" " "		W	S-M	W
	41	" " "		W	M	W
	55	" " "		W	M	W
	60	" " "		W	M	W
	61	" " "		W	M	W
	64	" " "		W	S-M	W
	124	High Yield (?)		light Y	S-M	R
	126	" " "		light Y	M	R
	130	" " "	Simto Hy.	Y	M	R
	148	Yellow Selection		light Y	M	W
	151	" " "		golden Y	M-L	W
	153	" " "		{ very light	S-M	W
	KYS	" " "	Simto.	{ pinkish	S-M	W
	155	" " "		{ yellow	S-M	W
	159	" " "		Y	M	W
	159	" " "		Y	M-L	W
	167	" " "		Y	S-M	W
	168	" " "		light Y	M	W
	179	" " "		Y	M	W
	180	" " "		Y	M	W
	201A	Midland.		Y	M	R
	214	Two Ear.		Y	S	R
	K4	Kansas Sunflower? K221		Y	S-M	R
	226	Hays Golden		Y	S-M	R
	230	Hays Golden		orange Y	S-M	R
Kentucky	11B	Boone Co. White		W	M-L	W
	13			W	M-L	W
	17	Some of these		W	M-L	W
	21			W	M-L	W
	27	lines started		W	M	W
	30-A	by Dr. Valleau.		W	M	W
	34			W	M	W
	35-7	" "		golden Y	S-M	W
	35-35	" "		Y	S-M	W
	36	" "		W	S-M	W
	36-18	" "		Y	M	R
	39	" "		W	M	W
	41	" "		W	S-M	W
	46	" "		W	S	W
	49	" "		W	M	W
	56	" "		W	M-L	W
	58	" "		W	S	W
	89	" "		W	M	W
	114	" "		W	M	W
	122	" "		W	S-M	W
	124	" "		W	M	W
	132	" "		W	S-M	W

Originating station.	Inbred line.	Parent variety.	Synonyms.	Color of seed.	Kernel size.	Chaff color.
Georgia	2-2			W	S	W
	5			W	S-M	W
	10			W	M	W
	13			W	M	W
	24			W	M	W
	25			W	S	W
	27			W	M	R
	27-2			W	M	R
	30			W	M	W
	30-2			W	M	W
	44			W	M	W
	55			W	S-M	W
	62			W	M-L	R
	75			W	S-M	W
	77			W	M	W
	87			W	S-M	W
	501			W	S	W
	503			W	S	W
	504			golden Y	S	W
	510			" Y	S	W
	515			" Y	M	W
	548			Y	S	W
	562			light Y	S	W
	568			Y	S	W
	569			golden Y	S	W
Michigan	1450			Y	M-L	R
	1459			light Y	M	R
Minnesota	A7			Y	M	R
	C11			orange	L	R
	A12			deep Y	M	R
	C14			light Y	S	R
	C15			W	M	W
	C16			W	S-M	W
	C19			W	M-L	W
	C20			W	M	W
	A26			golden Y	M	R
	A28			Y	M	R
	A71			Y	S-M	R
	A73			Y	M	R
	A94			reddish Y	S-M	R
	A96			Y	S-M	R
	A116			Y	M	W
	A131			Y	M	R
	A140			light Y	S	R
	A142			Y	S-M	W
	A145			Y	S-M	R
	A148			golden Y	M	R
	A155			Y	M	R
	A158			Y	M	R
	B164			Y	M	R
	A311			Y	M	R

Originating station.	Inbred line.	Parent variety	Synonyms.	Color of seed	Kernel size.	Chaff color.
Minnesota	A322			Y	M	R
	A334			Y	M	R
	A340			Y	M	W
	A344			golden Y	M	R
	A347			Y	M	R
	A357			light Y	M-L	R
	A374			golden Y	M	R
	A375			golden Y	S-M	R
Missouri	A392			Y	M	R
	G			reddish Y	M-L	R
	B <sub>2</sub>			Y	M	R
	L <sub>3</sub>			Y	S	R
	R136			deep Y	M-L	R
	557			Y	M-L	R
	7Ra			W	M-L	W
Nebraska	21a			W	M	W
	N6			deep Y	M	R
New Jersey	A12			deep Y	M	R
	A30			light Y	M	R
	B42			Y	M	R
	A47			orange Y	M	R
	A64			Y	S-M	W
Ohio	07			light Y	M	R
	26			chalky Y	M	R
	28			light Y	S-M	R
	33			golden Y	M	R
	40B			golden Y	M	W
	51			Y	S-M	P
	51A			Y	M	R
	56			light Y	M	R
	65			Y	M	R
	67			orange Y	S-M	R
Tennessee	84			Y	M	R
	J8-6G			Y	M	W
Texas	102A			W	L	W
	132A			Y	M-L	R
	158-4			W	M-L	W
USDA	1			light Y	M	W
	2			light Y	M	P
	3			light Y	M	R
	5			light Y	M	W
	6			golden Y	M	R
	7			light Y	M	W
	9			W	M-L	R
	11b			W	M	W
	23			W	M	W

<u>Originating station.</u>	<u>Inbred line.</u>	<u>Parent variety.</u>	<u>Synonyms.</u>	8.		
				<u>Color of seed.</u>	<u>Kernel size.</u>	<u>Chaff color.</u>
USDA	41			W	M	W
	42			W	M	W
	187-2			Y	S-M	R
	4-8			bright Y	S-M	R
	540			Y	S	R
Wisconsin	CC1			Y	S-M	R
	CC2			Y	M-L	R
	CC4			Y	M	R
	CC5			Y	M	R
	CC6			Y	M-L	R
	CC7			Y	M	R
	CC8			Y	M	R
	CC24			Y	M	R
	M50			Y	S	R
Indiana	JC33			W		
Iowa	KR (osf)			Y		
	198			Y?		
Wisconsin	CC25					
	CC26					

Numerous notes could be taken with regard to characteristics in corn. Prior to taking the notes on the 203 inbred lines of corn in the summer of 1941, an outline of possible taxonomic notes was made. This outline was followed to some extent. It is given below as a probable aid to future workers on the classification of inbred lines of corn:-

(next page)



I Plant Characters

- A. Stand.
- B. Vigor.
  - 1. Early
  - 2. Late
- C. Maturity.
  - 1. Days to  $\frac{1}{2}$  pollen
  - 2. " " " silk
  - 3. " of ripening
- D. Height.
  - 1. Plant
  - 2. Ear
- E. Lodging Resistance.
  - 1. Root )
  - 2. Stalk ) early
- F. Disease resistance.
  - 1. Diplodia
  - 2. Smut
- G. Insect resistance.
  - 1. Corn ear worm
  - 2. Aphids
  - 3. Chinch bug
  - 4. Grasshopper
- H. Drought resistance.
  - 1. Leaf surface fired
- I. Yield.
  - 1. Grain
  - 2. Fodder
- J. Ears per plant.
- K. Shank length.

II. Culm Characters.

- A. Color.
- B. Diameter (early  
late)
- C. Internode length.
- D. Nodes above ground.
  - 1. Number
    - a. to ear
    - b. total
  - 2. Prominence
- E. Brace roots.
  - 1. Size
  - 2. No. of nodes arising
- F. Suckers.
  - 1. Number
  - 2. Size

III. Leaf Characters.

- A. First leaf.
  - 1. Shape
  - 2. Size
- B. Leaf curl.
  - 1. Opening
    - a. Size
    - b. Shape
  - 2. No. of leaves
  - 3. Projection of top leaf

III Leaf Characters (contd.)

- C. Blade.
  - 1. Color of blade
  - 2. Color of midrib
  - 3. Stripedness
  - 4. Wrinkling
  - 5. Erectness
  - 6. Rigidity
  - 7. Waviness
  - 8. Length
  - 9. Width
  - 10. Flatness
  - 11. Creasing lengthwise
  - 12. Splotching
  - 13. Pubescence
    - a. upper surface
    - b. lower "
    - c. edge
    - d. on seeding
- D. Ligule.
  - 1. Height
  - 2. Character
- E. Auricles.
- F. Collar.
  - 1. Pubescence
- G. Sheath.
  - 1. Pubescence on edges
  - 2. Extent culm is covered
  - 3. Closed on upper part of culm
  - 4. Length in rel. to internode
  - 5. Color
  - 6. No. of sheaths colored
  - 7. Length of sheath
- H. Flag leaf.
  - 1. Rigidity
  - 2. Size
  - 3. Position in rel. to tassel
- I. Two-ranked

IV. Tassel Characters.

- A. Type.
- B. Length.
- C. Central Spike.
  - 1. Length
    - a. total
    - b. above lateral branches
  - 2. Rows of spikelets
  - 3. Shape
- D. Branches.
  - 1. Length
    - a. actual
    - b. in rel. to tassel length
  - 2. Number
  - 3. Density
    - a. no. spikelets per unit length
    - b. arrangement
  - 4. Barrenness of inner side of rachis.
  - 5. Rows of spikelets (2-4).

IV. Tassel Characters (contd.)

- E. Spikelet.
  - 1. Pedicel length
    - a. upper
    - b. lower
- F. Glume.
  - 1. Color
    - a. tip
    - b. base
    - c. edge
    - d. nerves
    - e. middle
  - 2. Size.
    - a. length
      - i. upper
      - ii. lower
    - b. width
      - i. upper
      - ii. lower
  - 3. Nerves.
    - a. number
      - i. upper spikelet
        - (a) first glume
        - (b) second glume
      - ii. lower spikelet
        - (a) first glume
        - (b) second glume
    - b. pubescence
- G. Lemma.
  - 1. Size.
    - a. length
    - b. width
  - 2. Nerves.
    - a. parallel or converging
    - b. number
    - c. Distinctness
  - 3. Shape
  - 4. Nature of the tip
- H. Palea (outer & inner may differ).
  - 1. Size
    - a. length
    - b. width
  - 2. Nerves
    - a. parallel or converging
    - b. number
    - c. distinctness
  - 3. Shape
  - 4. Nature at tip
- I. Stamen.
  - 1. Anther color (at pollen)
  - 2. Anther shape
  - 3. " length
  - 4. Pollen shedding
    - a. amount
  - 5. Anther color (later)
  - 6. Filament
    - a. shape
    - b. character
  - 7. Deciduous or persistent

10.

IV. Tassel Characters (contd.)

- J. Peduncle.
  - 1. size.
- K. Protrusion above flag leaf.

V. Silk Characters.

- A. Style.
  - 1. Color
- B. Stigma.
  - 1. Color
  - 2. Relative size
  - 3. " amount

VI. Ear Characters.

- A. Length.
- B. Shape.
- C. Kernel rows.
  - 1. Number
  - 2. Arrangement
- D. Cob color.

VII. Kernel Characters.

- A. Color.
- B. Shape.
- C. Size.
- D. Germ.
  - 1. Size
  - 2. Indentation
- E. Denting.
  - 1. Amount
  - 2. Nature
- F. Nature of tip cap.
- G. Amount of starchy material.
- H. " " corneous "

VIII. Root Characters.

- A. Seedling.
- B. Mature plant.

Two keys to inbred lines of corn were made. The vegetative key was made to facilitate the roguing of off-type plants due to mixing or cross-pollination. Furthermore, it is possible, with the aid of this key, to get an estimate of the number of rogues in a field.

Of the two keys, it is felt that the vegetative key will need the most revisions. The mature plant key will be quite useful to the inspectors in deciding whether or not to certify a field of seed corn. Inspection before tasselling may indicate the field as suspect of having more than the acceptable number of off-type plants. The inspector will be able to verify or disprove his doubts with the use of the mature plant key.

VEGETATIVE KEY TO INBRED LINES OF THE UNITED STATES.W. T. Federer.

- 1a. Lower sheaths green or mostly so.
  - 2a. Leaves heavily wrinkled.
    - 3a. Leaves dark green.
      - 4a. Leaves very wavy.
        - 5a. Leaves rigid -----La. 44
        - 5b. Leaves semirigid to nonrigid.
          - 6a. Leaves creased lengthwise, large wrinkles, large waves, shiny dark green -----USDA 137-2
          - 6b. Leaves mediumly creased lengthwise -----Mo. RL36
      - 4b. Leaves midwavy to nonwavy; semirigid, midirect.
        - 5a. Leaves heavily creased lengthwise.
          - 6a. Plants very vigorous -----Ind. H5
          - 6b. Plants midvigorous; large waves and wrinkles in leaves -----K 124
        - 5b. Leaves little creased lengthwise -----N.J. A47
  - 3b. Leaves medium green.
    - 4a. Leaves very wavy, nonerect, wide, long -----K 214
    - 4b. Leaves midwavy.
      - 5a. Leaves rigid, wide -----Iowa 447
      - 5b. Leaves semirigid.
        - 6a. Leaves erect -----Mo. 7Ra
        - 6b. Leaves midirect.
          - 7a. Leaves heavily creased lengthwise; plants vigorous.
            - 8a. Large waves, small wrinkles in leaves -----Minn. A357
            - 8b. Midlarge waves, midlarge wrinkles in leaves -----Ill. 5120
      - 7b. Leaves mediumly creased lengthwise.
        - 8a. Plants very vigorous. -----Ky. 124
        - 8b. Plants midvigorous.
          - 9a. Leaves V-shaped, narrow -----Wisc. CC2
          - 9b. Leaves flat or nearly so.
            - 10a. Leaf curl opening midlarge; midrib greenish -----Ky. 39
            - 10b. Leaf curl opening small; midrib whitish in color.
              - 11a. Leaf curl opening flattened -----N.J. B42
              - 11b. Leaf curl opening round -----Minn. A142
- 2b. Leaves midwrinkled to nonwrinkled.
  - 3a. Leaves very dark green, semirigid, midirect.
    - 4a. Leaves very wavy, heavily creased lengthwise; culms large -----K 55
    - 4b. Leaves midwavy, semirigid, midirect.
      - 5a. Leaves heavily creased lengthwise.
        - 6a. Leaves short -----Iowa 153
        - 6b. Leaves midlong.
          - 7a. Leaf curl opening small; wrinkles in leaves small -----Minn. A94
          - 7b. Leaf curl opening midlarge; wrinkles in leaves midlarge -----Minn. A334

5b. Leaves midcreased to noncreased lengthwise.

6a. Leaves midcreased lengthwise, wide;

plants vigorous -----Ill. L

6b. Leaves not creased lengthwise, midwide;

plants midvigorous -----Ohio 07

3b. Leaves midgreen.

4a. Leaves very wavy.

5a. Leaves rigid, erect, noncreased lengthwise,  
narrow.

6a. Leaf curl opening small -----K 64

6b. Leaf curl opening midlarge -----USDA 540

5b. Leaves semirigid.

6a. Leaves erect -----Ind. Fe

6b. Leaves midirect.

7a. Leaves wide, heavily creased lengthwise ---Ohio 56

7b. Leaves midwide, midcreased lengthwise.

8a. Plants vigorous -----Conn. 243

8b. Plants midvigorous.

9a. Midrib greenish -----Ky. 89

9b. Midrib white -----K.151

4b. Leaves midwavy to nonwavy.

5a. Leaves rigid, erect, noncreased lengthwise;  
plants vigorous.

6a. Leaves V-shaped, long -----Tex. 158-4

6b. Leaves flat or nearly so, midlong.

7a. Waves in leaf small; leaf curl opening

large -----La. 2-2

7b. Waves in leaf midlarge; leaf curl opening

small -----Iowa 701

5b. Leaves semirigid to nonrigid.

6a. Leaves erect; plants weak -----K 10

6b. Leaves midirect.

7a. Leaves heavily creased lengthwise.

8a. Plants vigorous.

9a. Leaves revolute -----Wisc. CCl

9b. Leaves flat.

10a. Leaves midspotched; leaf curl opening

midlarge -----Minn. C20

10b. Leaves nonsplotched; leaf curl opening

small -----Minn A96

8b. Plants not especially vigorous.

9a. Plants weak; midrib greenish; leaf curl

opening large -----K 201A

9b. Plants midvigorous.

10a. Leaves V-shaped, short, midspotched ---Minn. C16

10b. Leaves flat or nearly so.

11a. Leaves wide, midlong -----K 230

11b. Leaves midwide.

12a. Leaves long; midrib greenish; leaf

curl opening small -----Wisc. C05

12b. Leaves not long.

- 13a. Leaves midlong; midrib green; leaf curl opening small -----Minn. A26
- 13b. Leaves short.
- 14a. Midrib green; leaf curl opening small -----Minn. A116
- 14b. Midrib whitish; leaf curl opening midlarge -----Minn. A7
- 7b. Leaves not heavily creased lengthwise.
- 8a. Leaves not creased lengthwise.
- 9a. Plants weak; leaves short -----K 4
- 9b. Plants midvigorous.
- 10a. Leaves narrow, midlong -----Minn. A347
- 10b. Leaves midwide, long -----Ky 21
- 8b. Leaves midcreased lengthwise.
- 9a. Plants vigorous.
- 10a. Leaves V-shaped, midspotched -----Minn. A392
- 10b. Leaves not V-shaped.
- 11a. Leaves revolute, long -----USDA 9
- 11b. Leaves flat or nearly so, midlong. leaf curl opening small.
- 12a. Midrib greenish -----Iowa 349
- 12b. Midrib white.
- 13a. Leaves not striped -----Ohio 33
- 13b. Leaves partly striped -----Minn. A375
- 9b. Plants midvigorous; leaves flat or nearly so.
- 10a. Leaves wide.
- 11a. Leaves long; culms midlarge -----Ky 132
- 11b. Leaves midlong; culms midlarge.
- 12a. Leaves midspotched; leaf curl opening midlarge -----Iowa Pr
- 12b. Leaves nonsplotched; leaf curl opening large; leaves a characteristic whitish green -----Mo G
- 10b. Leaves not wide.
- 11a. Leaves narrow.
- 12a. Leaves short, midspotched; leaf curl opening small -----Minn. A12
- 12b. Leaves midlong, nonsplotched; leaf curl opening midlarge -----K 17
- 11b. Leaves midwide.
- 12a. Leaves midlong -----Ohio 51A
- 12b. Leaves short.
- 13a. Culm small; midrib white -----Minn. A148
- 13b. Culm midlarge; midrib greenish -----Minn. A145
- 1b. Lower sheaths distinctly not green, but a purplish hue over green or mostly purplish.
- 2a. Leaves heavily wrinkled.
- 3a. Leaves dark green, midwavy to nonwavy.
- 4a. Leaves rigid.
- 5a. Leaves erect, not creased lengthwise -----USDA 3
- 5b. Leaves miderect, heavily creased lengthwise-----Ill R4

- 4b. Leaves semirigid to nonrigid.
  - 5a. Leaves erect; culms small -----La. 503
  - 5b. Leaves miderect.
    - 6a. Leaves long, not creased lengthwise -----Ky. 34
    - 6b. Leaves midlong, midcreased lengthwise.
      - 7a. Leaves nonerect, nonstriped -----Iowa 426
      - 7b. Leaves miderect, striped -----Ill. M14
- 3b. Leaves midgreen to light green.
  - 4a. Leaves very wavy.
    - 5a. Leaves nonrigid, long, flat -----Fla. 4
    - 5b. Leaves semirigid.
      - 6a. Leaves V-shaped, midlong -----Ky. 36
      - 6b. Leaves flat or nearly so, long; midrib green---Ky. 36-18
  - 4b. Leaves midwavy or nonwavy.
    - 5a. Leaves nonwavy, noncreased lengthwise, erect; culms small -----Tex. 132A
    - 5b. Leaves midwavy.
      - 6a. Leaves rigid.
        - 7a. Leaves erect; midrib green.
          - 8a. Leaves heavily creased lengthwise; plants midvigorous -----N.J. A30
          - 8b. Leaves not creased lengthwise, light green; plants weak -----Iowa 159
        - 7b. Leaves miderect; midrib mostly white.
          - 8a. Leaves heavily creased lengthwise, revolute---Iowa 397
          - 8b. Leaves not heavily creased lengthwise, flat or nearly so.
            - 9a. Plants weak; leaves short -----Iowa 345
            - 9b. Plants vigorous; leaves midlong -----Iowa 159L1
    - 6b. Leaves semirigid or nonrigid.
      - 7a. Leaves nonrigid, miderect, heavily creased lengthwise.
        - 8a. Leaves midlong; midrib green -----Ohio 84
        - 8b. Leaves long; midrib white -----USDA 4-8
      - 7b. Leaves semirigid.
        - 8a. Leaves erect, short -----Iowa 234
        - 8b. Leaves miderect.
          - 9a. Leaves heavily creased lengthwise.
            - 10a. Leaves nonsplotched; plants midvigorous; midrib green -----Ky. 114
            - 10b. Leaves midspotched to heavily splotched; plants vigorous; midrib white.
              - 11a. Leaf curl opening small -----Minn. A374
              - 11b. Leaf curl opening midlarge -----Conn. 14
          - 9b. Leaves not heavily creased lengthwise.
            - 10a. Leaves not creased lengthwise.
              - 11a. Leaves long; leaf curl opening midlarge--Ky. 49
              - 11b. Leaves midlong; leaf curl opening large--Ky. 17
            - 10b. Leaves midcreased lengthwise.
              - 11a. Plants very vigorous; leaves long -----Ind. B2
              - 11b. Plants not very vigorous.
                - 12a. Plants weak; wrinkles in leaves large ---Iowa 289
                - 12b. Plants midvigorous.
                  - 13a. Leaves V-shaped, long, midwide -----Minn. A71

- 13b. Leaves flat or nearly so, wide, midlong.
  - 14a. Culms large ----- Minn. A73
  - 14b. Culms midlarge ----- Wisc. CC24
- 2b. Leaves not heavily wrinkled.
  - 3a. Leaves dark green.
    - 4a. Leaves nonwavy, noncreased lengthwise, V-shaped.
      - 5a. Leaves rigid, midrect ----- Ky. 13
      - 5b. Leaves nonrigid, erect.
        - 6a. Leaves long, midspotched ----- Fla. 2
        - 6b. Leaves midlong, nonsplotched, light green  
stripes between dark green ----- Mo. L3
    - 4b. Leaves midway.
      - 5a. Leaves rigid.
        - 6a. Leaves heavily creased lengthwise, short;  
plants vigorous; culms midlarge ----- Minn. A344
        - 6b. Leaves midcreased lengthwise, midlong, mid-  
splotched; plants midvigorous; culms large;  
midrib green ----- Tenn. J8-6G
      - 5b. Leaves midrigid or nonrigid.
        - 6a. Leaves nonrigid.
          - 7a. Leaves erect, noncreased, light green stripes  
between dark green ----- Iowa 317
          - 7b. Leaves midrect, midcreased lengthwise,  
nonstriped ----- La. 55
        - 6b. Leaves semirigid, midwide.
          - 7a. Leaves erect, midlong.
            - 8a. Leaves noncreased lengthwise, flat or  
nearly so, midstriped; plants vigorous;  
culms large ----- K 148
            - 8b. Leaves midcreased lengthwise, nonstriped.
              - 9a. Leaves revolute; plants midvigorous ----- N.J. A12
              - 9b. Leaves flat or nearly so; plants vigorous ----- Ind. 33-16
          - 7b. Leaves midrect.
            - 8a. Leaves noncreased lengthwise, long; culms  
large ----- Fla. 1
            - 8b. Leaves midcreased lengthwise, midlong;  
culms midlarge.
              - 9a. Plants midvigorous; leaves midstriped ----- Ohio 65
              - 9b. Plants vigorous; leaves nonstriped.
                - 10a. Leaf curl opening small ----- Ind. H22
                - 10b. Leaf curl opening midlarge ----- USDA 7
    - 3b. Leaves not dark green.
      - 4a. Leaves not midgreen.
        - 5a. Leaves yellowish green ----- Ky. 11B, USDA 11b-71
        - 5b. Leaves light green.
          - 6a. Leaves very wavy, V-shaped ----- Ky. 46
          - 6b. Leaves midway to nonwavy.
            - 7a. Leaves nonwavy.
              - 8a. Leaves rigid, erect, long ----- La. 30-2
              - 8b. Leaves semirigid, midlong.
                - 9a. Leaves nonrect, heavily creased length-  
wise, narrow ----- Wisc. M50
                - 9b. Leaves erect, noncreased lengthwise,  
midwide, V-shaped ----- La. 25



- 7b. Leaves midwavy.
  - 8a. Leaves rigid; plants vigorous.
    - 9a. Leaves erect, midstriped -----Iowa 224
    - 9b. Leaves miderect, nonstriped.
      - 10a. Leaves not creased lengthwise, narrow, midlong -----Ill. Hy
      - 10b. Leaves midcreased lengthwise, midwide, long -----K 130
  - 8b. Leaves semirigid to nonrigid.
    - 9a. Leaves nonrigid, noncreased lengthwise----La. 548
    - 9b. Leaves semirigid.
      - 10a. Leaves erect, midspotched.
        - 11a. Leaves nonstriped, midlong -----Conn. 21
        - 11b. Leaves little striped, long -----La. 515
      - 10b. Leaves miderect.
        - 11a. Leaves heavily creased lengthwise, wide; midrib green -----La. 77
        - 11b. Leaves not heavily creased lengthwise.
          - 12a. Leaves noncreased lengthwise, long, flat or nearly so.
            - 13a. Leaves narrow -----K 60
            - 13b. Leaves midwide; culms large -----K 153, KYS--58.
          - 12b. Leaves midcreased lengthwise.
            - 13a. Plants vigorous, leaves midspotched-Iowa 420
            - 13b. Plants midvigorous.
              - 14a. Leaves very wide -----Ky. 58
              - 14b. Leaves midwide.
                - 15a. Leaves midspotched -----USDA 1
                - 15b. Leaves nonsplotched.
                  - 16a. Leaves long; leaf curl opening very large -----La. 569
                  - 16b. Leaves midlong; leaf curl opening large -----Ill. 5678
    - 4b. Leaves midgreen.
      - 5a. Leaves very wavy, miderect.
        - 6a. Leaves rigid, noncreased lengthwise.
          - 7a. Leaves narrow -----K 168
          - 7b. Leaves midwide -----K 159
        - 6b. Leaves semirigid.
          - 7a. Leaves noncreased lengthwise.
            - 8a. Plants vigorous; culms large; leaves long--USDA 5
            - 8b. Plants midvigorous; culms midlarge; leaves midlong -----Ky. 41
          - 7b. Leaves midcreased lengthwise.
            - 8a. Plants vigorous; leaves long -----Ind. Tr
            - 8b. Plants midvigorous or weak; leaves midlong.
              - 9a. Plants weak; leaves nonstriped -----Ohio 28
              - 9b. Plants midvigorous; leaves striped -----USDA 6
      - 5b. Leaves midwavy or nonwavy.
        - 6a. Leaves nonwavy.
          - 7a. Leaves rigid.
            - 8a. Leaves erect, midlong; plants midvigorous--La. 30
            - 8b. Leaves miderect, long; plants vigorous -----USDA 2
          - 7b. Leaves semirigid or nonrigid.

- 8a. Leaves nonrigid, heavily creased lengthwise.
  - 9a. Plants vigorous; culms midlarge -----Minn. C11
  - 9b. Plants midvigorous; culms small.
    - 10a. Leaf curl opening midlarge -----Minn. A155
    - 10b. Leaf curl opening small -----Minn. A158
- 8b. Leaves semirigid.
  - 9a. Leaves erect.
    - 10a. Leaves narrow, midlong -----Tex. 102A
    - 10b. Leaves midwide, long -----Fla. 3
  - 9b. Leaves miderect.
    - 10a. Leaves noncreased lengthwise; plants weak -----K 41
    - 10b. Leaves heavily creased lengthwise; plants midvigorous -----Minn. C19
- 6b. Leaves midwavy.
  - 7a. Leaves rigid.
    - 8a. Leaves erect.
      - 9a. Leaves midcreased lengthwise -----La. 10
      - 9b. Leaves noncreased lengthwise.
        - 10a. Midrib green. -----La. 5
        - 10b. Midrib white.
          - 11a. Leaves narrow, midlong, midspotched ----La. 24
          - 11b. Leaves midwide, long, nonsplotched ----La. 87
    - 8b. Leaves miderect.
      - 9a. Leaves noncreased lengthwise.
        - 10a. Leaves flat or nearly so -----Ky. 35-7
        - 10b. Leaves V-shaped.
          - 11a. Plants vigorous; leaves short -----La. 501
          - 11b. Plants midvigorous; leaves midlong -----K 179
      - 9b. Leaves midcreased lengthwise.
        - 10a. Plants vigorous; culms large -----Ky. 122
        - 10b. Plants midvigorous.
          - 11a. Leaves V-shaped -----K 126
          - 11b. Leaves flat or nearly so.
            - 12a. Leaves narrow, midlong -----La. 504
            - 12b. Leaves midwide, short.
              - 13a. Leaves midspotched -----Fla. 90
              - 13b. Leaves nonsplotched -----La. 27
  - 7b. Leaves semirigid or nonrigid.
    - 8a. Leaves nonrigid, miderect.
      - 9a. Leaves heavily creased lengthwise; culms small -----Wisc. C08
      - 9b. Leaves midcreased or noncreased lengthwise.
        - 10a. Plants vigorous; leaves V-shaped, narrow, long -----K 61
        - 10b. Plants midvigorous; leaves flat or nearly sb.
          - 11a. Leaves narrow -----Minn. A131
          - 11b. Leaves midwide.
            - 12a. Leaves long -----K 19
            - 12b. Leaves midlong -----N.J. A64
    - 8b. Leaves semirigid.
      - 9a. Leaves erect midwide, midlong.
        - 10a. Leaves noncreased lengthwise; culms large -----Ky. 35-35

- 10b. Leaves midcreased lengthwise; culms midlarge.
- 11a. Leaves very little wrinkled, wrinkles small-----K 180
- 11b. Leaves midwrinkled, wrinkles midlarge-----Ky. 30-A
- 9b. Leaves midirect or nonirect.
- 10a. Leaves nonirect.
- 11a. Leaves heavily creased lengthwise, narrow-----Minn. C14
- 11b. Leaves midcreased lengthwise, midwide-----Wisc. CC7
- 10b. Leaves midirect.
- 11a. Leaves heavily creased lengthwise.
- 12a. Plants vigorous.
- 13a. Leaves V-shaped, narrow-----La. 562
- 13b. Leaves flat or nearly so, midwide-----Minn. B164
- 12b. Plants midvigorous.
- 13a. Culms small; leaves nonsplotched-----Minn. A28
- 13b. Culms midlarge; leaves midplotched-----Mo. 21a
- 11b. Leaves midcreased or noncreased lengthwise.
- 12a. Leaves noncreased lengthwise.
- 13a. Plants vigorous; leaves V-shaped-----Ohio 51
- 13b. Plants midvigorous or weak.
- 14a. Plants weak-----K 226
- 14b. Plants midvigorous.
- 15a. Leaves V-shaped, midwide, midlong.
- 16a. Culms small-----Ky. 27
- 16b. Culms midlarge-----USDA 43
- 15b. Leaves flat or nearly so.
- 16a. Leaves narrow, midlong.
- 17a. Culms small; midrib green-----Minn. A322
- 17b. Culms midlarge; midrib white-----Ky. 56
- 16b. Leaves midwide; culms midlarge.
- 17a. Leaves midplotched-----La. 62
- 17b. Leaves nonsplotched.
- 18a. Leaf curl opening flattened-----Nebr. N6
- 18b. Leaf curl opening round.
- 19a. Leaf curl opening large.
- 20a. Leaves long, wrinkles small-----Iowa 401
- 20b. Leaves midlong, wrinkles midlarge-----La. 13
- 19b. Leaf curl opening not large.
- 20a. Plants glaucous-----K 167
- 20b. Plants not glaucous.
- 21a. Midlarge waves, small wrinkles in  
leaves-----La. 568
- 21b. Small waves, midlarge wrinkles in  
leaves-----Minn. A311
- 12b. Leaves midcreased lengthwise.
- 13a. Plants vigorous.
- 14a. Leaves wide, midplotched-----Ind. WF9
- 14b. Leaves midwide.
- 15a. Leaves long.
- 16a. Culms large; leaves nonwrinkled-----Conn. 20
- 16b. Culms midlarge; leaves midwrinkled.
- 17a. Midrib green-----Ind. 66
- 17b. Midrib white.
- 18a. Leaf curl opening midlarge-----Mich. 1450
- 18b. Leaf curl opening small.
- 19a. Leaves partly striped-----Ind. 38-11
- 19b. Leaves nonstriped-----Mich. 1459

- 15b. Leaves midlong or short.
- 16a. Leaves short, midsplotched -----Wisc. 004
- 16b. Leaves midlong.
- 17a. Leaf curl opening midlarge-----Ohio 67
- 17b. Leaf curl opening small.
- 18a. Leaves partly striped-----Mo. 557
- 18b. Leaves nonstriped-----Iowa 456
- 13b. Plants midvigorous.
- 14a. Leaves V-shaped.
- 15a. Leaves short-----Minn. 015
- 15b. Leaves midlong.
- 16a. Leaf curl opening small -----Minn. A340
- 16b. Leaf curl opening midlarge -----USDA 23
- 14b. Leaves flat or nearly so.
- 15a. Leaves wide, long, partly striped-----K 155
- 15b. Leaves midwide or narrow.
- 16a. Leaves narrow, long -----La. 510
- 16b. Leaves midwide.
- 17a. Leaves long.
- 18a. Leaf curl opening small -----Iowa 197
- 18b. Leaf curl opening midlarge -----La. 75
- 17b. Leaves midlong.
- 18a. Leaves striped -----K 8
- 18b. Leaves partly or nonstriped.
- 19a. Leaves partly striped.
- 20a. Leaf curl opening midlarge-----Ill. A
- 20b. Leaf curl opening small.
- 21a. Mostly 2 leaves per leaf curl-----Wisc. 006
- 21b. Mostly 1 leaf per leaf curl-----Ohio 40B
- 19b. Leaves mostly nonstriped.
- 20a. Midrib green-----La. 27-2
- 20b. Midrib mostly white.
- 21a. Leaf curl opening flattened-----Ohio 26
- 21b. Leaf curl opening round.
- 22a. Wrinkles on leaves small; leaves tending  
to dark green-----Iowa 205
- 22b. Wrinkles on leaves midlarge; leaves  
lighter than Iowa 205-----USDA 41

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W. T. Federer

- 1a. Kernels white.
  - 2a. Chaff red; base of glumes green; styles green.
    - 3a. Tassel branches forming 20-70 degree angle with central spike; drooping.
      - 4a. Anthers long; plants late-----Fla. 1
      - 4b. Anthers midlong; plants midseason-----USDA 9
    - 3b. Tassel branches forming less than 20 degrees angle with central spike; plants late, midtall to tall.
      - 4a. Tassel branches and central spike drooping; stigmas red-----La. 27
      - 4b. Tassel branches erect or mostly so; stigmas green.
        - 5a. Tassel branches about 17 in number-----La. 27-2
        - 5b. Tassel branches about 25 in number-----La. 62
- 2b. Chaff white.
  - 3a. Base of glumes red or purple (except Ky. 114 which is segregating); plants midtall to tall, midseason to late.
    - 4a. Tassel branches forming less than 20 degree angle with central spike, about 10-15 in number.
      - 5a. Styles red; stigmas red; plants midseason-----K 19
      - 5b. Styles green.
        - 6a. Stigmas red; plants late; tips of glumes red--La. 77
        - 6b. Stigmas green.
          - 7a. Plants tall; leaves midlong-----La. 30
          - 7b. Plants taller than above, more vigorous; leaves long -----La. 30-2
    - 4b. Tassel branches forming a 20-70-degree angle with central spike; styles green.
      - 5a. Stigmas red.
        - 6a. Plants midseason, tall; leaves heavily wrinkled-Ky. 34
        - 6b. Plants late, midtall; leaves midwrinkled-----La. 75
      - 5b. Stigmas green.
        - 6a. Plants midseason; leaves dark green, erect-----Ind. 33-16
        - 6b. Plants late; leaves miderect.
          - 7a. Leaves not wrinkled, dark green-----Ky. 13
          - 7b. Leaves heavily wrinkled, midgreen.
            - 8a. Leaves not creased lengthwise, long-----Ky. 49
            - 8b. Leaves creased lengthwise, midlong-----Ky. 114
  - 3b. Base of glumes green.
    - 4a. Tassel branches forming 20-70 degree angle with central spike.
      - 5a. Tassel branches drooping.
        - 6a. Styles red; stigmas red; plants early, short---Conn. 20
        - 6b. Styles green.
          - 7a. Stigmas red; plants late, tall-----La. 13
          - 7b. Stigmas green.
            - 8a. Anthers red; plants late, tall-----La. 55
            - 8b. Anthers purplish yellow or yellow.
              - 9a. Plants midseason; lower sheaths purplish---Ky. 21
              - 9b. Plants late; lower sheaths purplish or mostly so.

- 10a. Tassel branches about 25 in number; tips of glumes red; plants midtall; leaves midgreen, creased lengthwise-----Mo. 21a
- 10b. Tassel branches about 16 in number; tips of glumes green; plants short; leaves greenish yellow in color, noncreased lengthwise-----USDA 11b
- 5b. Tassel branches erect.
- 6a. Tassel branches mostly less than 10 in number; styles green; stigmas green.
- 7a. Anthers dark purple; plants very early-----Minn. C15
- 7b. Anthers yellowish or purplish yellow; plants midseason
- 8a. Plants tall; leaves heavily wrinkled-----Ky. 17
- 8b. Plants midtall; leaves midwrinkled-----Ky. 30-A
- 6b. Tassel branches more than 10 in number.
- 7a. Styles red; stigmas red.
- 8a. Anthers yellowish brown, long; leaves erect-----La. 10
- 8b. Anthers purple, midlong; leaves midereect.
- 9a. Plants midtall; tassel branches about 13 in number; culms small-----Ky. 27
- 9b. Plants tall; tassel branches about 22 in number; culms large-----Ky. 122
- 7b. Styles green.
- 8a. Stigmas red.
- 9a. Anthers red or reddish green.
- 10a. Plants tall late; tips of glumes green; leaves midereect-----K 60
- 10b. Plants midtall, midseason; tips of glumes red; leaves erect-----Conn. 21
- 9b. Anthers yellowish green.
- 10a. Tassel branches about 20 in number; tips of glumes green; leaves nonwavy-----K 17
- 10b. Tassel branches about 14 in number; tips of glumes red; leaves wavy.
- 11a. Leaves not V-shaped-----Ky. 41
- 11b. Leaves V-shaped-----Ky. 46
- 8b. Stigmas green.
- 9a. Tassel branches mostly more than 24 in number.
- 10a. Plants midseason; leaves V-shaped, narrow, long-----K 61
- 10b. Plants late; leaves not V-shaped.
- 11a. Tips of glumes red; leaves wavy, long, nonrigid-----Fla. 4
- 11b. Tips of glumes green.
- 12a. Culm color red; leaves midwrinkled; kernels large-----Tex. 102A
- 12b. Culm color green or mostly so.
- 13a. Leaves nonwrinkled; kernels small-----La. 2-2
- 13b. Leaves heavily wrinkled; kernels midlarge-Ky. 124
- 9b. Tassel branches mostly 16-18 in number.
- 10a. Tips of glumes red.
- 11a. Leaves wavy, rigid, not V-shaped, narrow-----K 64
- 11b. Leaves midwavy, midrigid, V-shaped, midwide-USDA 43
- 10b. Tips of glumes green.
- 11a. Plants short; leaves creased lengthwise.
- 12a. Plants very early; leaves nonwavy, midgreen-Minn. C20
- 12b. Plants midseason; leaves wavy, dark green-K 55

- 11b. Plants not short, late; leaves midcreased lengthwise.
- 12a. Leaves heavily wrinkled, erect -----Mo. 7Ra
- 12b. Leaves not heavily wrinkled, midirect.
- 13a. Leaves midwide-----K 8
- 13b. Leaves narrow-----Ky. 56
- 4b. Tassel branches not forming 20-70 degree angle with central spike.
- 5a. Tassel branches horizontal or nearly so.
- 6a. Styles red; stigmas red; leaves very wide -----Ky. 58
- 6b. Styles green; stigmas green; tips of glumes red; leaves midwide.
- 7a. Plants short to midtall; leaves nonwavy, V-shaped--K 41
- 7b. Plants tall; leaves midwavy, not V-shaped-----USDA 41
- 5b. Tassel branches forming less than 20 degree angle with central spike.
- 6a. Central spike and tassel branches drooping; styles green; plants late.
- 7a. Stigmas red; leaves heavily wrinkled.
- 8a. Anthers red; tips of glumes red; plants tall-----Ky. 39
- 8b. Anthers yellow; tips of glumes green; plants midtall -----La. 44
- 7b. Stigmas green; leaves not heavily wrinkled.
- 8a. Plants tall; leaves dark green, V-shaped -----Fla. 2
- 8b. Plants short; leaves greenish yellow, revolute-----Ky. 11B
- 6b. Central spike and tassel branches erect or nearly so.
- 7a. Anthers purple.
- 8a. Tassel branches about 15 in number; tips of glumes green; plants short, very early; leaves creased lengthwise -----Minn. C19
- 8b. Tassel branches 24 or more in number; tips of glumes red; plants very tall.
- 9a. Plants late; stigmas green; leaves erect -----Fla. 3
- 9b. Plants midseason; stigmas red; leaves midirect---Ky. 132
- 7b. Anthers mostly yellowish green.
- 8a. Styles red; stigmas red; plants tall.
- 9a. Leaves not V-shaped; plants very late-----La. 5
- 9b. Leaves V-shaped; plants midseason-late -----Tex. 158-4
- 8b. Styles green.
- 9a. Stigmas red; plants late to very late.
- 10a. Plants very tall; leaves midwavy, rigid, erect--La. 87
- 10b. Plants midtall; leaves wavy, semirigid, midirect.
- 11a. Leaves midwrinkled, not V-shaped -----Ky. 89
- 11b. Leaves heavily wrinkled, V-shaped -----Ky. 36
- 9b. Stigmas green.
- 10a. Plants early to very early.
- 11a. Plants midtall, early; leaves dark green; tips of glumes red -----Ind H22
- 11b. Plants short, very early; leaves midgreen; tips of glumes green -----Minn. C16
- 10b. Plants midseason to late.
- 11a. Tassel branches about 27 in number; plants tall.
- 12a. Leaves dark green; heavily wrinkled, erect-----La. 503
- 12b. Leaves midgreen, midwrinkled, midirect-----USDA 23
- 11b. Tassel branches about 15-18 in number.
- 12a. Plants short to midtall midseason-late -----K 10
- 12b. Plants midtall to tall, late.

- 13a. Tips of glumes red; leaves midirect, short---La. 501
- 13b. Tips of glumes green; leaves erect, midlong.
- 14a. Leaves rigid, not V-shaped, narrow; kernels  
midlarge -----La. 24
- 14b. Leaves semirigid, V-shaped, midwide;  
kernels small -----La. 25
- 1b. Seeds not white.
- 2a. Chaff white.
- 3a. Tassel branches not forming 20-70 degree angle with  
central spike.
- 4a. Tassel branches horizontal or nearly so; plants  
midseason.
- 5a. Styles red; stigmas red; leaves wavy -----USDA 5
- 5b. Styles green; stigmas green; leaves midwavy -----USDA 7
- 4b. Tassel branches forming less than 20 degree angle  
with central spike, erect.
- 5a. Base of glumes light red; tips of glumes red;  
leaves erect -----Ky. 35-35
- 5b. Base of glumes green.
- 6a. Tips of glumes green.
- 7a. Tassel branches about 5 in number; plants short,  
very early -----Minn. A116
- 7b. Tassel branches about 20 in number; plants tall,  
midseason-late -----K 179
- 6b. Tips of glumes red.
- 7a. One to no tassel branches; anthers red -----N.J. A64
- 7b. Ten or more tassel branches; anthers yellowish  
or purplish yellow-green.
- 8a. Styles red; stigmas red.
- 9a. Plants midseason; leaves dark green, rigid-----Tenn. J8-6G
- 9b. Plants late; leaves light green, semirigid-----USDA 1
- 8b. Styles green.
- 9a. Stigmas green; leaves dark green, erect-----K 148
- 9b. Stigmas red or mostly so; leaves midgreen, midirect.
- 10a. Plants especially tall, very late; leaves  
V-shaped, creased lengthwise, narrow; (stigmas  
segregating for color) -----La. 562
- 10b. Plants not especially tall or late; leaves  
not V-shaped, noncreased lengthwise; midwide.
- 11a. Leaves rigid -----Ky. 35-7
- 11b. Leaves semirigid, characteristic green-----K 167
- 3b. Tassel branches forming 20-70 degree angle with  
central spike.
- 4a. Tassel branches and central spike drooping; base  
of glumes segregating for color; plants especially  
tall, late -----La. 515
- 4b. Tassel branches and central spike erect or nearly  
so; base of glumes green.
- 5a. styles red; stigmas red.
- 6a. Plants tall, very late; leaves narrow; tips of  
glumes red -----La. 510
- 6b. Plants midtall to tall, midseason; leaves wide;  
tips of glumes green -----K 155
- 5b. Styles green.
- 6a. Stigmas red; plants very tall, very late; leaves  
rigid, narrow -----La. 504



- 6b. Stigmas green; anthers mostly yellowish green or purplish yellow in color.
- 7a. Plants especially tall, very late; leaves nonrigid; tassel branches about 34 in number -----La. 548
- 7b. Plants not especially tall; tassel branches 25 or less in number; glume edges not brown in color.
- 8a. Plants very late, tall; kernels small.
- 9a. Leaves midgreen, nonwrinkled, noncreased lengthwise -----La. 568
- 9b. Leaves light green, midwrinkled, midcreased lengthwise -----La. 569
- 8b. Plants not especially late, mostly midtall or shorter.
- 9a. Plants short, early.
- 10a. Leaves heavily wrinkled, not V-shaped-----Minn. A142
- 10b. Leaves midwrinkled, V-shaped -----Minn. A340
- 9b. Plants mostly midtall, midearly to midlate.
- 10a. Tassel branches less than ten in number.
- 11a. Leaves wavy, rigid -----K 159
- 11b. Leaves midwavy, semirigid -----Ohio 40B
- 10b. Tassel branches 14-25 in number.
- 11a. Leaves light green; kernels light pinkish yellow, small -----(K 153(YS)  
----- (K 153(KYS)
- 11b. Leaves midgreen to darker; kernels midlarge to larger.
- 12a. Leaves midwavy, erect-----K 180
- 12b. Leaves wavy, miderect.
- 13a. Leaves rigid, narrow -----K 168
- 13b. Leaves semirigid, midwide -----K 151
- 2b. Chaff not white.
- 3a. Base of glumes red or mostly so (except Wisc. CC24).
- 4a. Tassel branches forming a 20-70 degree angle with central spike, erect.
- 5a. Tassel branches about 19-25 in number.
- 6a. Edges of glumes not brown; plants late, tall -----K 201A
- 6b. Edges of glumes brown; plants short, midseason-----K 226
- 5b. Tassel branches about 9-15 in number; plants short; styles green.
- 6a. Stigmas red; edges of glumes brown; tips of glumes mostly red; leaves heavily wrinkled.
- 7a. Plants very early; leaves creased lengthwise, midwide; tassel branches about 9 in number-----Conn. 14
- 7b. Plants midseason; leaves midcreased lengthwise, wide; tassel branches about 12-15 in number; (plants segregating for color of base of glume)---Wisc. CC24
- 6b. Stigmas green.
- 7a. Edges of glumes not brown; leaves wavy -----Ohio 28
- 7b. Edges of glumes brown; leaves midwavy.
- 8a. Leaves heavily wrinkled, V-shaped, narrow -----Wisc. CC2
- 8b. Leaves midwrinkled, not V-shaped, midwide-----Wisc. CC6
- 4b. Tassel branches not forming 20-70 degree angle with central spike, mostly less than 17 in number; edges of glumes brown; styles green.
- 5a. Tassel branches horizontal or nearly so, 6-7 in number; plants very short, very early; leaves creased lengthwise.

- 6a. Tassel branches drooping; leaves light green -----Wisc. M50
- 6b. Tassel branches not drooping; leaves midgreen -----Minn. C14
- 5b. Tassel branches forming less than 20 degree angle  
with central spike.
- 6a. Tassel branches drooping; base of glume light red-Nebr. N6
- 6b. Tassel branches erect or nearly so.
- 7a. Tassel branches about five in number; anthers  
purple -----Ohio 26
- 7b. Tassel branches about five in number; anthers  
yellow or purplish yellow.
- 8a. Plants very short, very low-eared; leaves dark  
green -----Ohio 65
- 8b. Plants short to midtall; leaves midgreen -----Mo. 557
- 3b. Base of glumes not red or purple.
- 4a. Tassel branches not forming 20-70 degree angle with  
central spike; edges of glumes brown.
- 5a. Tassel branches horizontal or nearly so.
- 6a. Styles light red; stigmas red; anthers red; leaves  
erect -----Iowa 234
- 7a. Tassel branches more than 15 in number; plants  
midtall.
- 8a. Tassel branches about 28 in number; plants late;  
leaves midwavy, noncreased lengthwise -----K 221 (K4)
- 8b. Tassel branches about 16 in number; plants  
midseason; leaves wavy; creased lengthwise-----Ohio 56
- 7b. Tassel branches about 4 or 8 in number.
- 8a. Tassel branches about 4 in number; stigmas red--Iowa 197
- 8b. Tassel branches about 8 in number; stigmas green.
- 9a. Plants very early, short; leaves nonwrinkled,  
light green -----Minn. A158
- 9b. Plants midseason, midtall to tall; leaves  
heavily wrinkled, dark green -----N.J. A47
- 5b. Tassel branches forming less than 20 degree angle  
with central spike.
- 6a. Tassel branches and central spike drooping;  
plants short.
- 7a. Tassel straw colored; plants very early; leaves  
midgreen -----Minn. A131
- 7b. Tassel not straw colored; plants midseason; leaves  
dark green -----N.J. A12
- 6b. Tassel branches erect or nearly so.
- 7a. Tassel branches less than 12 in number.
- 8a. Tassel branches 10-12 in number; leaves dark  
green, short, creased lengthwise.
- 9a. Plants very short; styles red; stigmas red;  
leaves semirigid -----Iowa 153
- 9b. Plants short; styles and stigmas segregating  
for color; leaves rigid -----Minn. A344
- 8b. Tassel branches about five in number.
- 9a. Anthers purple; tips of glumes red -----Iowa 426
- 9b. Anthers yellowish; tips of glumes green -----Conn. 243
- 7b. Tassel branches 15 or more in number.
- 8a. Plants early.

- 9a. Tassel branches about 40 in number; anthers yellow -----Iowa 447
- 9b. Tassel branches about 15-16 in number; anthers not yellow; tips of glumes red.
- 10a. Anthers purple; plants midtall; leaves long, midwide -----Ind. 66
- 10b. Anthers brick red; plants short; leaves midlong, narrow -----Minn. A322
- 3b. Plants midseason; anthers yellow or yellowish purple; stigmas green.
- 9a. Plants midtall; leaves light green; kernels large -----Ill. 5678
- 9b. Plants short-midtall; leaves midgreen; kernels small to small-midlargo.
- 10a. Leaves wavy, erect -----Ind. Fo
- 10b. Leaves midwavy, niderect -----Ohio 67
- 4b. Tassel branches forming 20-70 degree angle with central spike.
- 5a. Tassel branches drooping; edges of glumes brown.
- 6a. Anthers purple; tips of glumes red; styles green.
- 7a. Stigmas green.
- 8a. Tassel branches about 24 in number; plants midseason, short; leaves rigid, short -----Ill. 90
- 8b. Tassel branches about 15 in number; plants very early, midtall; leaves semirigid, long -----Mich. 1459
- 7b. Stigmas red; leaves long; tassel branches 26 or 33 in number.
- 8a. Leaves wavy; kernels roddish orange -----Ind. Tr
- 8b. Leaves midwavy; kernels yellow -----Mich. 1450
- 6b. Anthers not purple.
- 7a. Styles red; stigmas red.
- 8a. Plants midseason, midtall; culms zigzag; characteristic greenish, yellowish purple anthers; tips of glumes red -----K 126
- 8b. Plants very early; anthers yellowish green.
- 9a. Leaves nonwavy, midgreen; kernels orange -----Minn. C11
- 9b. Leaves midwavy, light green; kernels yellow -----Wisc. CC8
- 7b. Styles green.
- 8a. Stigmas red; tassel branches 13-14 in number.
- 9a. Tassel straw-colored; leaves creased lengthwise-----Minn. A28
- 9b. Tassel not straw-colored; tips of glumes green; leaves mid- or noncreased lengthwise.
- 10a. Plants short; leaves narrow -----Minn. A347
- 10b. Plants midtall; leaves midwide -----Ohio 33
- 8b. Stigmas green.
- 9a. Tassel branches about 15-20 in number.
- 10a. Plants midseason.
- 11a. Plants tall; leaves wavy, nonrigid, wide, long -----K 214
- 11b. Plants short; leaves midwavy, midrigid, midwide, midlong -----Wisc. CC7
- 10b. Plants early.
- 11a. Plants midtall; leaves heavily wrinkled, V-shaped -----Minn. A71
- 11b. Plants short; leaves midwrinkled, not V-shaped.
- 12a. Leaves midgreen, nonwavy, nonrigid-----Minn. A7
- 12b. Leaves dark green, midwavy, semirigid-----Minn. A334

- 9b. Tassel branches less than 14 in number.
- 10a. Tassel branches about 3 in number; leaves heavily wrinkled -----USDA 4-8
- 10b. Tassel branches about 9-14 in number.
- 11a. Plants midtall to tall, midseason; tips of glumes red.
- 12a. Leaves heavily wrinkled, midgreen, semi-rigid, midirect -----Iowa 289
- 12b. Leaves nonwrinkled, dark green, nonrigid, erect.
- 13a. Leaves midwavy -----Iowa 317
- 13b. Leaves nonwavy -----Mo. L3
- 11b. Plants short to short-midtall, very early to early-midseason; tips of glumes green.
- 12a. Plants short.
- 13a. Tassel straw-colored; plants very early; leaves nonwrinkled -----Minn. A155
- 13b. Tassel not straw-colored; plants early; leaves heavily wrinkled -----N.J. B42
- 12b. Plants short-midtall.
- 13a. Leaves heavily wrinkled, rigid, erect, creased lengthwise -----N.J. A30
- 13b. Leaves midwrinkled, semirigid, midirect, midcreased lengthwise.
- 14a. Leaves midgreen, wide -----Ind. WF9
- 14b. Leaves shiny almost dark green, midwide -----Iowa 205
- 5b. Tassel branches erect; styles green (except Iowa 456 and Ohio 51),
- 6a. Stigmas red; edges of glumes brown.
- 7a. Anthers purple; tips of glumes red in color.
- 8a. Plants late, midtall; tassel branches about 24 in number; leaves a characteristic whitish-green-Mo. G
- 8b. Plants early; tassel branches 14 or 6 in number.
- 9a. Tassel branches 14 in number; plants midtall; leaves rigid, light green, nonwrinkled -----Ill. Hy
- 9b. Tassel branches 6 in number; plants short; leaves semirigid.
- 10a. Leaves dark green, heavily wrinkled, creased lengthwise -----Ind. H5
- 10b. Leaves midgreen, midwrinkled, midcreased lengthwise -----Minn. A375
- 7b. Anthers yellowish green.
- 8a. Tassel branches 14-17 in number; leaves dark green.
- 9a. Tips of glumes red; plants late, midtall; culms zigzag; leaves heavily wrinkled, rigid, erect, noncreased lengthwise -----USDA 3
- 9b. Tips of glumes green; plants early, short; leaves midgreen, semirigid, midirect, creased lengthwise-Minn. A94
- 8b. Tassel branches mostly 10 or less in number.
- 9a. Tassel branches about 3 in number, leaves erect, rigid -----Iowa 224
- 9b. Tassel branches about 6 or 10 in number; leaves midirect.
- 10a. Tassel branches 6 in number; plants very early; leaves midgreen, midcreased lengthwise, nonwrinkled -----Wisc. 004

- 10b. Tassel branches about 10 in number; plants early to midseason; leaves dark green, creased lengthwise, heavily wrinkled.
- 11a. Leaves rigid -----Ill. R4
- 11b. Leaves semirigid -----K 124
- 6b. Stigmas green.
- 7a. Anthers brick red or purple; edges of glumes brown; tips of glumes red.
- 8a. Anthers brick red; tassel branches about 30 in number -----Minn. A311
- 8b. Anthers purple.
- 9a. Tassel branches about 10 in number; plants short, early; leaves heavily wrinkled, dark green -----Ill. M14
- 9b. Tassel branches about 24-27 in number; leaves not heavily wrinkled, midgreen.
- 10a. Plants midseason, midtall; leaves midwavy, creased lengthwise -----K 230
- 10 b. Plants late, tall; leaves striped, wavy, mid-creased lengthwise -----USDA 6
- 7b. Anthers not red or purple.
- 8a. Tassel straw colored; plants very early, very short; leaves narrow, short -----Minn. A12
- 8b. Tassel not straw-colored.
- 9a. Edges of glumes not colored differently from glumes (except Mo. R136 and Ohio 07 which are segregating).
- 10a. Tips of glumes red in color.
- 11a. Tassel branches about 9 in number; leaves heavily wrinkled, wavy -----Ky. 36-13
- 11b. Tassel branches 14 or 20 in number; leaves long, not heavily wrinkled, midwavy.
- 12a. Leaves semirigid, midgreen -----Ind. 38-11
- 12b. Leaves rigid, light to midgreen -----K 130
- 10b. Tips of glumes green; plants midseason.
- 11a. Tassel branches 22-24 in number; leaves rigid, midgreen.
- 12a. Leaves midwavy, erect -----Iowa 701
- 12b. Leaves wavy, midereet -----USDA 540
- 11b. Tassel branches about 16 in number; leaves semirigid, dark green.
- 12a. Leaves heavily wrinkled, wavy -----Mo. R136
- 12b. Leaves midwrinkled, midwavy -----Ohio 07
- 9b. Edges of glumes brown.
- 10a. Anthers short; tips of glumes red; plants early; leaves heavily wrinkled, rigid, revolute, creased lengthwise -----Iowa 397
- 10b. Anthers not short in length.
- 11a. Plants short, very to early.
- 12a. Tassel branches 6-7 or 10 in number; tips of glumes green.
- 13a. Tassel branches about 10 in number.
- 14a. Leaves heavily wrinkled, creased lengthwise, not V-shaped -----Minn. A357
- 14b. Leaves non-wrinkled, noncreased lengthwise, V-shaped -----Minn. A392
- 13b. Tassel branches about 6-7 in number.
- 14a. Leaves heavily wrinkled, nonrigid -----Ohio 84
- 14b. Leaves midwrinkled, semirigid.
- 15a. Leaves creased lengthwise, midlong -----Minn. A96
- 15b. Leaves midcreased lengthwise, short -----Minn. A145

- 12b. Tassel branches 13-15 in number.
- 13a. Tips of glumes red -----Ill. A
- 13b. Tips of glumes green.
- 14a. Plants very early; leaves nonwrinkled, short;  
culms small -----Minn. A148
- 14b. Plants early.
- 15a. Leaves midwrinkled, creased lengthwise -----Minn. A26
- 15b. Leaves heavily wrinkled.
- 16a. Leaves midcreased lengthwise, wide; culms  
large -----Minn. A73
- 16b. Leaves creased lengthwise, midwide; culms  
midlarge -----Minn. A374
- 11b. Plants not short.
- 12a. Tassel branches less than 12 in number.
- 13a. Tips of glumes green on all the glumes.
- 14a. Leaves midwrinkled, midgreen, midwavy, midcreased  
lengthwise (segregating for stigma color & style color)-Iowa 456
- 14b. Leaves wrinkled, dark green, wavy, creased  
lengthwise -----USDA 137-2
- 13b. Tips of glumes red or red and green.
- 14a. Leaves heavily wrinkled.
- 15a. Leaves semirigid; plants vigorous -----Ind. B2
- 15b. Leaves rigid; plants weak.
- 16a. Leaves erect, midlong -----Iowa 159
- 16b. Leaves midrect, short -----Iowa 345
- 14b. Leaves not heavily wrinkled.
- 15a. Leaves rigid, long, narrow -----USDA 2
- 15b. Leaves semirigid, midlong, midwide.
- 16a. Tassel branches about 5 in number; kernels  
reddish -----Iowa 349
- 16b. Tassel branches about 10 in number; kernels  
yellow -----Iowa 420
- 12b. Tassel branches 13 or more in number.
- 13a. Plants late, tall; leaves erect, heavily wrinkled;  
tips of glumes red -----Tex. 132A
- 13b. Plants mostly midtall, early to midseason.
- 14a. Leaves heavily wrinkled.
- 15a. Leaves rigid, midcreased lengthwise; considerable  
amount of purple in leaves and midribs -----Iowa 159L1
- 15b. Leaves semirigid, creased lengthwise -----Ill. 5120
- 14b. Leaves not heavily wrinkled.
- 15a. Leaves dark green, wide -----Ill. L
- 15b. Leaves midgreen.
- 16a. Leaves creased lengthwise.
- 17a. Leaves semirigid -----Minn. B164
- 17b. Leaves nonrigid.
- 18a. Leaves midwavy, revolute -----Wisc. CC1
- 18b. Leaves nonwavy, flat or nearly so -----Wisc. CC5
- 16b. Leaves midcreased or noncreased lengthwise.
- 17a. Leaves V-shaped (styles greenish pink) -----Ohio 51
- 17b. Leaves not V-shaped.
- 18a. Leaves wide, midlong; culms large -----Iowa Pr
- 18b. Leaves midwide.
- 19a. Leaves long -----Iowa 401
- 19b. Leaves midlong -----Ohio 51A

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